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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/800,471

Filing Date: March 15, 2004

Appellant(s): EWERT ET AL.

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Rodney B. Carroll  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the Appeal Brief filed 12 March 2010 appealing from the Office action mailed 19 May 2009.

**(1) Real Party in Interest**

The examiner has no comment on the statement, or lack of statement, identifying by name the real party in interest in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The following is a list of claims that are rejected and pending in the application:

Claims 1, 3-6, 10-13, 15-18, 20-31, 35-37, 39, 41-46 and 48-65.

**(4) Status of Amendments After Final**

The examiner has no comment on the appellant's statement of the status of amendments after final rejection contained in the brief.

**(5) Summary of Claimed Subject Matter**

The examiner has no comment on the summary of claimed subject matter contained in the brief.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The examiner has no comment on the appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office action from which the appeal is taken (as modified by any advisory actions) is being maintained by the examiner except for the grounds of rejection (if any) listed under the subheading "WITHDRAWN REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

### **(7) Claims Appendix**

The examiner has no comment on the copy of the appealed claims contained in the Appendix to the appellant's brief.

### **(8) Evidence Relied Upon**

5,689,028	LASHIER et al	11-1997
5,750,816	ARAKI et al	5-1998
6,380,451	KREISCHER et al	4-2002

### **(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1, 3-6, 10-13, 15-18, 20-31, 35-37, 39, 41-46 and 48-65 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Lashier et al, Araki et al and Kreischer et al, considered separately.

Lashier et al [“Lashier”] disclose a process to regulate olefin production by deactivating the catalyst system which comprises the sequential steps of contacting a reactor effluent stream with an alcohol, removing and recovering any desired olefin product(s), adding an aqueous base to the reactor stream effluent, removing a solid product from the reactor stream effluent, separating organic and aqueous phases, adding an acid to the aqueous phase and recovering the precipitate. Lashier teaches that a catalyst system useful in the invention comprises a chromium source, a pyrrole-containing compound and a metal alkyl such as an aluminum alkyl. See column 1. Lashier teaches that the chromium source includes one or more organic or inorganic

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compounds including halogen-containing compounds. See column 1, line 55 to column 2, line 34. Lashier teaches that the pyrrole-containing compound can be any pyrrole-containing compound that will react with a chromium source to form a chromium pyrrolide complex. See column 2, line 35 to column 3, line 13. Lashier teaches that the alkylaluminum compounds may also be halogenated. See column 3. Reactants and reaction conditions are set forth in columns 4-5. Lashier teaches that suitable alcohol compounds have six or more carbon atoms and include 1-hexanol, 2-ethyl-hexanol, 1-heptanol, 1-octanol, and others. See column 6. No water content in the alcohol component is disclosed so the examiner is of the position that water-free alcohols are used. Lashier discloses that after the catalyst has been deactivated, or “killed”, olefin product(s) can be removed. Lashier teaches that “any removal process can be used, although distillation is preferred for ease of use. See column 6, lines 22-25. Although Lashier does not set forth a reboiler distillation temperature of below about 190°C, Lashier teaches the same distillation removal step. Since the process of Lashier is the same as the process claimed, it is reasonable to conclude that the reboiler temperature in the distillation step is the same or similar. The examiner maintains the position that the process of Lashier appears to be indistinguishable from the claimed processes.

Araki et al [“Araki”] disclose a process for preparing alpha-olefin oligomers using a chromium-based catalyst system comprising (a) a chromium compound, (b) at least one nitrogen-containing compound, and (c) an alkylaluminum compound. Arkai teaches that the process recovers the produced alpha-olefin oligomers, the catalyst components and the by-product polymers from the reaction solution. The prior art teaches that suitable chromium compounds are set forth in column 2, lines 42 et. seq. Suitable nitrogen-containing compounds

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include pyrrole and pyrrolide compounds as set forth in column 4. Araki teaches that the alkylaluminum compounds may be halogenated. See column 6. Araki teaches that the oligomerization process is carried out in a solvent and a compound soluble in the solvent and having a bonding ability to the chromium such as an alcohol compound is added to the reaction solution. Suitable alcohols include hexanol, heptanol, and diols. See column 12. Reaction conditions are set forth in columns 8-9. Araki teaches that the reaction effluent stream may then be supplied into a product distillation tower to recover the produced alpha-olefin oligomers as a distillate while concentrating the by-product polymers (i.e., heavies) and catalyst components which are recovered as a bottoms product. See column 2, lines 5-25 and column 9, lines 12-24. Although Araki does not set forth a reboiler distillation temperature of below about 190°C, Araki teaches that any reaction conditions which can affect the above-mentioned steps can be used. See columns 9-14. The examiner maintains the position that the process of Araki appears indistinguishable from the claimed processes.

Kreischer et al [“Kreischer”] discloses a process of cleaning an oligomerization reactor after making a higher olefin in the reactor. The oligomerization reaction causes a co-product residue of the catalyst to form on the interior surface of the reactor. Suitable catalyst systems used in such a reaction include the combination of a chromium source, a pyrrole-containing compound and one or metal alkyls such as aluminum alkyl compounds. The interior surface of the reactor is then contacted with an alcohol under conditions effective to remove at least a substantial amount of the catalyst residue from the interior surface of the reactor. Kreischer teaches that the catalyst-removing step can be carried out by combining an alcohol with the process medium used in the reactor. Kreischer set forth reaction conditions in columns 7-9.

Suitable alcohols have 6-12 carbon atoms and include 1-hexanol and 1-heptanol. Kreischer teaches that after the catalyst has been deactivated, the olefin product(s) are removed from the reactor effluent stream. Kreischer teaches that any removal process can be used although distillation is preferred for ease of use. See column 9, lines 63 to column 10, line 14. Although Kreischer does not set forth a reboiler distillation temperature of below about 190°C, Kreischer teaches that any reaction conditions which can affect the above-mentioned steps can be used. See columns 10-11. The examiner maintains the position that the process of Kreischer appears to be indistinguishable from the claimed processes.

#### **(10) Response to Argument**

Appellants argue that the claims are not attempting to merely claim methods for catalyst system deactivation but are rather directed to processes having steps for deactivating a catalyst system and limiting or inhibiting the decomposition of a deactivated catalyst system. Additionally, appellants argue that the claimed method may be particularly important in decreasing or eliminating the corrosion of equipment resulting from decomposition of the deactivated catalyst system in distillation towers. Appellants argue that the temperature of material passed through a reboiler of a distillation tower relates to olefin oligomerization product isolation, and that the reboiler temperature is a feature of product isolation and not a reaction condition. Appellants argue that the previous office action has failed to present a *prima facie* case of obviousness in relation to the pending independent claims. This is not deemed to be persuasive because Lashier, Araki and Kreischer all teach that after the catalyst deactivation, the olefin products can be removed by any removal process, preferably distillation. Further, Lashier

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teaches that any reaction conditions which can affect the above-mentioned steps are useful, and removal of the olefin product(s) by distillation was an above mentioned step. Reaction conditions are assumed to include temperature and pressure. In considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonable be expected to draw therefrom.

Although Lashier, Araki and Kreischer do not teach the temperature of a reboiler in the separation of the olefin(s) product by distillation, the prior art teaches that any reaction conditions which can affect the above-mentioned steps, including separation of the same product(s) by distillation, can be used. Thus the examiner maintains the position that the skilled artisan would know what reboiler temperatures could reasonably be used to effectively run the olefin(s) separation process by distillation without resulting in unwanted decomposition of the components. The examiner maintains the position that since the processes of the applied prior art references use the same catalyst system as the claims, the same method of deactivation of the catalyst system by the same alcohols of the claims, and the same product recovery step of distillation as the claims, the reboiler temperature of less than 190°C most likely was also used since no decomposition of the catalyst system and no corrosion of the process equipment was evident. Further, the examiner maintains the position that the fact that appellants have discovered that at reboiler temperatures higher than 190°C the deactivated catalyst system decomposition begins to increase does NOT result in the patentability of a known process. The examiner maintains the position that where the general conditions of a claim are disclosed in the prior art it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 CCPA 1955.

Appellants additionally make the following arguments:

(B)(1) Appellants argue that the reboiler temperature is a result effective variable.

Appellants point to the specification on page 21 which discloses that the decomposition temperature was observed to occur just above 190°C (374° F) at all of the alcohol deactivation levels. Appellants point to Figure 1 which shows the effect temperature has on the 2-ethyl-1-hexanol deactivated diethylaluminum chloride via the differential in the amount of alcohol detected (which is a measure of catalyst decomposition) in the overhead fraction of a distillation.

Appellants point to Figure 3 which shows the effect temperature has on 2-ethyl-1-hexanol deactivated diethylaluminum chloride via the percentage of octenes formed in the absence of water (diamond shaped data points); the amount of octenes formed increase substantially at temperatures greater than 190°C. Appellants argue that Figures 1 and 3 clearly show that the temperature at which material is maintained (as in a distillation tower reboiler) is a result-effective variable relating to inhibiting or limiting “the decomposition of the deactivated catalyst system during recovery of an olefin oligomerization product”.

The results and appellants arguments have been carefully considered; however, only one alcohol has been tested, namely 2-ethyl-1-hexanol and the claims at issue are not limited to this one particular alcohol. All of the independent claims cite “an alcohol” which is a term broad enough to include short chain alcohols, long chain alcohols, branched and straight chain alcohols, polyhydoxy alcohols, unsaturated alcohols, etc. Thus the examiner is of the position that appellants have not demonstrated that the reboiler temperature is a result effective variable for all of the possible alcohols which may be used in the claimed process and which include those taught by the applied prior art references. The examiner is of the position that the results

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presented by appellants are not commensurate in scope of the claims which are of considerably greater scope.

(B)(2) Appellants argue that a temperature of below about 190°C for which the material passed through the reboiler is a critical value.

Again appellants rely upon the results presented for one deactivation alcohol, namely 2-ethyl-1-hexanol, for the determination of “criticality”. Although the temperature at which the alcohol decomposes could be considered “critical”, it is not unexpected since all chemical components decompose at some high temperature. Additionally, the claims at issue are not limited to 2-ethyl-1-hexanol as argued hereinabove, and the applied prior art broadly discloses that monofunctional alcohols having 6 to 12 carbon atoms per molecule may be used for the best catalyst system deactivation. See column 9, lines 29-43, of Kreischer. Included in Kreischer is 2-ethyl-1-hexanol and several additional alcohols including 1-hexanol, 2-hexanol, 3-hexanol, 3-octanol, 1-heptanol, 2-heptanol, 3-heptanol, 4-heptanol, 2-methyl-3-heptanol, 1-octanol, 2-octanol, 3-octanol, 4-octanol, 7-methyl-2-decanol, 1-decanol, 2-decanol, 3-decanol, 4-decanol, 5-decanol, 2-ethyl-1-decanol, and mixtures of any two or more of these, all of which are taught as suitable to be added to the reactor effluent stream to deactivate or “kill” the olefin production catalyst system and to inhibit or halt the production of undesirable solids, particularly polymer or catalyst acids. Thus the examiner is of the position that it is not clear that the temperature of below about 190°C for all of the possible materials (different alcohols and mixtures thereof) which may be passed through the reboiler is a critical value.

(C)(1) Appellants argue that the Final Office Action has improperly equated reaction conditions with product recovery conditions.

As previously set forth, the applied prior art references teach that after the catalyst system has been deactivated or “killed”, olefin products, such as, for example, 1-hexene, can be removed and that “*Any* removal process can be used, although distillation is preferred for ease of use.” (emphasis added) See column 9, line 63 to column 10, line 14 of Kreischer. See column 6, lines 22-26, of Lashier. Araki discloses that “Distillation is usually used for purification whereby the objective substance can be recovered with high purity” in column 14, lines 36-38. Thus, appellants’ removal process, distillation, is preferred by the applied prior art references for ease of use. The examiner agrees that product recovery conditions including the specifics of the distillation process have not been set forth in the applied prior art references.

(C)(2) Araki’s teaching away from the claim feature of “Material passed through the reboiler is maintained below about 190°C” prohibits the conclusion that one of ordinary skill in the art would have known the instantly claimed methods.

Appellants argue that Araki discloses in Examples 1, 3 and 10 that heater/heating pipe temperatures used are 230°C, 200°C, and 200°C respectively. Appellants argue that these heater/heating pipe temperatures would lead to material passed through the reboiler exceeding a temperature of about 190°C as recited in independent claims 1, 18, 37 and 57, and that Araki teaches conditions away from the claimed invention. This is not deemed to be persuasive because the invention of Araki is not limited to the specific examples set forth, but broadly to what is taught to one of ordinary skill in the art which is that any removal process may be used and that distillation is a preferred removal process. The examples in Araki referred to by appellants disclose the Evaporator temperature (same as reboiler?) and Example 10 discloses a

bottom temperature for the Distillation tower of 162°C and a recovery tank temperature of 150°C.

(C)(3) The assertion that a “Reboiler temperature of less than 190°C was most likely used” is based upon an invalid logical argument and results in an improper *per se* obviousness determination.

As previously set forth, the applied prior art references do not specify a reboiler temperature for the distillation process which is disclosed in all three references as the preferred removal process in a process to regulate olefin production by deactivating a catalyst system which comprises the steps of contacting a reactor effluent stream with an alcohol, and then removing and recovering any desired olefin product(s). Since a reboiler temperature is not taught, appellants cannot unequivocally argue that the prior art process did not include a reboiler temperatures at or below 190°C in the distillation removal process. As set forth in MPEP 2112, where applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but the function is not explicitly disclosed by the reference, the examiner may make a rejection under both 35 U.S.C. 102 and 103, expressed as a 102/103 rejection. “There is nothing inconsistent in concurrent rejections for obviousness under 35 U.S.C. 103 and for anticipation under 35 U.S.C. 102.” *In re Best*, 562 F.2d 1252, 1255 n.4, 195 USPQ 430, 433 (CCPA 1977). The MPEP continues to state that This *same rationale should also apply to product, apparatus, and process claims claimed in terms of function, property or characteristic*. Therefore, a 35 U.S.C. 102/103 rejection is appropriate for these types of claims as well as for composition claims.

(D) Presumption that water-free alcohols are used is a holding of Inherency based upon possibilities.

Appellants argue that in relation to the independent claim 18 feature reciting “contacting an alcohol with an adsorbent capable of adsorbing water”, the examiners position that since no water content is disclosed for the alcohol component, water-free alcohols must be used, is in error. The adsorbent is added to the alcohol to minimize the water content of the alcohol. However, since all three applied references teach that the alcohol is added to the reaction effluent, and that such alcohols include 1-hexanol, 2-hexanol, 3-hexanol, etc., it is not clear how this limitation of contacting the alcohol with an adsorbent capable of adsorbing water distinguishes over the prior art.

#### **(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner’s answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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